Enhancing Human Development through Climate Change Policy

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Abstract*—Climate Change policy proposals are complicated by the dilemma of fossil fuels, which are both the primary cause of global warming and a necessity for human development. An empirical comparison of the United Nation's Human Development Index (HDI) and per capita CO_2 emissions by country confirms that nations with higher HDI values produce more CO_2 as a result of greater energy consumption. The comparison also exposes the diminishing returns in human development that accrue as greenhouse gas emissions increase. Taking this relationship into consideration begs the moral question of what responsibility developed countries have to improve conditions in underdeveloped nations. That is, given that climate policy demands management of global CO_2 emissions, cuts in the emissions of developed countries could enable emissions increases in underdeveloped countries that result in major improvements in human development. Nevertheless, the dominant cap and trade climate policy proposals are myopic at addressing these development inequities. While the cap is necessary to curb global CO_2 emissions, a market-based approach to trade will result in allocating CO_2 emissions to the most profitable countries. Consequently, the relatively inefficient and underdeveloped countries will use the revenue from permit sales to purchase goods from more technologically sophisticated countries, rather than foster domestic production. The capabilities approach stresses that gains in financial resources alone are insufficient to improve the human condition without the supportive services that channel investment toward effective development. We assert that for developing nations CO_2 is a fundamental necessity, given that current technology constraints make CO_2 emissions at least a co-requisite to achieving minimally acceptable levels of human development. To this end, we advocate prohibiting CO_2 emissions trading between countries of different development stages. Without permit sales, developed countries will have incentives to locate production in underdeveloped countries to comply with carbon caps. Local production in the underdeveloped countries will lead to improvements in the human condition rather than merely fueling consumption from carbon sales revenue.

Key Terms*—Climate Change, Human Development, Capability Approach, Cap and Trade, Emissions Trading

I. Introduction

A growing body of evidence links increasing global temperatures to greenhouse-gas (GHG) emissions, particularly carbon dioxide (CO_2), which results from energy production (e.g., IPCC, 2007; Mann et al., 2003; Karl & Trenberth, 2003). However, industrialization and the use of fossil fuels (e.g., through transportation, electricity generation, and food production) remain the most significant means of development available under current technology constraints. Furthermore, it is estimated that it will be at least several decades before renewable-energy industries can substantially replace oil, coal, and natural gas energy sources (Ayres & Ayres 2010). Nevertheless, preventing irreversible damage to our vital ecological systems and their ecosystem services demands the urgent mitigation of anthropogenic climate change.

The responsibility for current atmospheric GHG concentrations lies primarily on the developed nations, who have largely benefitted from the energy consumption concomitant to CO_2 emissions. Energy accounts for 83% of the anthropogenic GHG emissions in Annex I (developed) countries, and about 65% of global emissions, resulting from the production, transformation, handling and consumption of all kinds of energy commodities (IEA, 2010). Consequently, activities that result in CO_2 emissions have benefitted global society, albeit unevenly. Rates of consumption have risen as dramatically as concentrations of CO_2. According to the United Nations Development Programme (UNDP), consumption reached $24 trillion at the end of the twentieth century—which is twice the level of 1975 and six times that of 1950 (UNDP, 1998). The United Nations (UN) thus reports remarkable increases in the standard of living for hundreds of millions people. However, 20% of consumers living in the nations with the highest income account for 86% of all private consumption, and the bottom 20% consume just more than 1% (UNDP, 1998).

An empirical comparison of the United Nation's Human Development Index (HDI) and per capita CO_2 emissions by country confirms that countries with higher HDI values produce more CO_2 as a result of greater energy consumption (Figure 1). The comparison also exposes the diminishing returns in human development that accrue as greenhouse gas emissions increase. Taking this relationship into consideration begs the moral question of what responsibility developed countries have to improve conditions in less-developed nations. That is, given that climate policy demands management of global CO_2 emissions, reductions in the emissions of developed countries could enable emissions increases in underdeveloped countries that result in major improvements in human development.

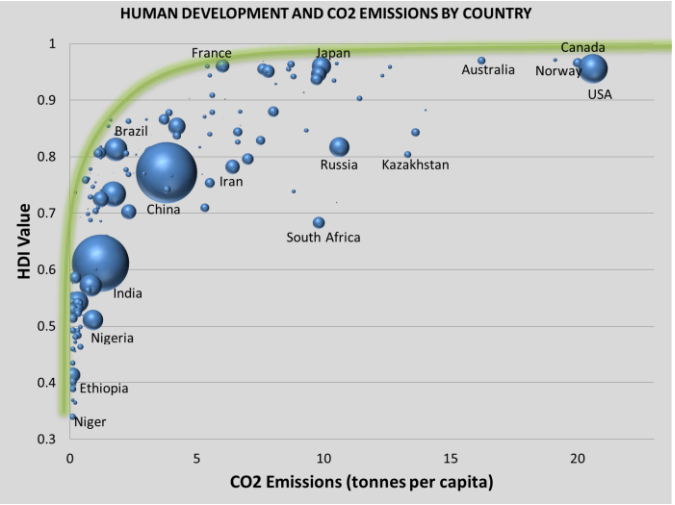

Figure 1. *A diminishing returns relationship is displayed between each country's CO_2 emissions per capita and HDI value. The area of the bubbles represents the size of the population of each country. Data is from the 2007/2008 Human Development Report.*

One popular policy proposal attempts to resolve the climate problem by proposing a rigid cap on global GHG emissions, and market for trading that optimize GHG allocations for greatest profitability. In effect, cap and trade approaches to climate policy will result in a system where goods are produced and re-distributed to less technologically sophisticated countries through trade. From this view, energy is a mechanism that enables the production of consumer goods that, through trade, will most efficiently maximize global consumption while complying with the global carbon cap. Alternatively, we assert that access to reliable energy, namely fossil fuels under current technology constraints, is a necessity for fostering local, sustainable development (e.g. water distribution systems). To that end, we believe that an unrestricted cap-and-trade system is immoral because it will present an obstacle to the meeting the legitimate energy needs of large portions of the global population. As a solution, we propose prohibiting emissions trading between countries of different development levels. Although less economically efficient, this prohibition will result in greater improvements in the human condition.

Our essay is organized as follows: First, we provide an overview of key political and philosophical climate mitigation methods that utilize a cap and trade approach to allocate CO_2 emissions. We continue by criticizing these proposals as insufficient solutions, emphasizing their failure to account for disparities between levels of development. Next, we present a framework offered by Baer (2009) that attempts to address development inequities in assigning responsibility for climate mitigation. However, we then provide empirical evidence that suggests Baer's approach would allocate resources *away* from those in need of development. As a remedy, we offer the capability approach as an appropriate basis for allocating carbon rights and we conclude that the principle of development equity (compared with consumption equity) suggests that limits on carbon trading are necessary to promote sustainable development through the domestic production of essential goods and services.

II. Cap and Trade Climate Policy

The international community has made some effort to reduce and/or stabilize fossil fuel combustion in order to slow the growth of atmospheric CO_2 concentration, and thus curb climate change. Previous proposals have focused on the market-based system of cap and trade. This strategy lowers emissions by placing a *cap* on the global atmospheric concentration of GHGs, and allocates emission rights to the most profitable producers through the *trade* of permits. The initial distribution of emission rights are moral statements of climate justice that vary by proposal. For example, in 1992 the United Nations Framework Convention on Climate Change (UNFCCC) established the principle of *common but differentiated responsibilities*, meaning that they recognize the historical differences in the contributions of developed and developing regions to global environmental problems, as well as the differences in their respective economic and technical capacity to tackle these problems (UNFCCC, 1998). The UNFCCC codified this principle in the Kyoto Protocol in December 1997, which sets binding GHG emissions reduction targets for major developed countries to collectively reduce emissions on average by 5.2% relative to 1990 during the period of 2008—2012. Under the protocol, developing countries are exempt from emission reduction targets because they historically contributed little to the emission problem and require an increased share of global emissions from these to meet development needs. The Protocol includes a trade mechanism that allows developed nations (Annex B Parties), that emit more than their target level, to purchase additional emission rights from countries that have emission rights to spare (UNFCCC, 1998).

Philosophy literature also provides examples of climate policy proposals that are based on the cap and trade approach to mitigation. Singer (2004) and Jamieson (2001) propose similar ideas on what they believe to be ethical, yet efficient, methods of carbon allocation. They each suggest a forward looking approach to climate justice that allocates carbon emissions on an equal per capita basis. From this perspective, every person has a right to the same level of GHG emissions, regardless of their nationality. This approach requires scientific agreement on the total allowable amount of GHG emissions, divided by the total world population. Each country, then, would be allowed to emit the sum of their population times the allowable emissions per person. (According to Singer, emissions caps would be based on future projections of population, whereas Jamieson suggests indexing the population to a negotiable baseline year). Both authors supplement caps with a trade system, whereby countries that require more than their per capita allowance can buy allowances from countries that emit less.

Although popular, the strategies discussed above have also been criticized. A recent study suggests that the Kyoto Protocol has been largely unsuccessful at mitigating GHG

emissions. Peters et al. (2011) assert that reports claiming stabilization of emissions in some developed countries under Kyoto are misleading because they do not consider the emission transfers resulting from international trade. Under the Intergovernmental Panel on Climate Change (IPCC) mitigation accounting rules used to evaluate the Kyoto Protocol, only emissions and removals occurring with a country's national territory count towards caps. However, emissions from the production of traded goods and services comprised 26% of global emissions in 2008; assigning emissions from international trade to the consuming (rather than producing) nations reveals that developed countries (Annex B countries) have indeed caused an increase in global emissions, with a large share of the emissions originating in developing countries (Peters et al., 2011).

This reality draws attention to the fact that the primary purpose of emissions trading is to reduce the cost of compliance with caps, while (secondarily) providing compensation to underdeveloped countries that use less than their allowable emissions. As such, implementing this type of strategy will not necessarily foster sustainable development, and may create additional impediments. The following criticism of Singer's *One World* is offered in a *NY Review of Books* commentary (Skidelsky & Joshi, 2004):

> "Even from a utilitarian perspective, substantial redistribution of wealth and income toward poor countries is subject to a variety of problems. Will poor countries be able to absorb aid productively? Will the aid reach the poor? Will it promote reliant self-development? A particularly stark issue arises from the fact that the world's poor (those living on less than $1 a day) are increasingly to be found in so-called "failed states," many of them in sub-Saharan Africa—states defined not by murderous intent but by lack of competence to secure for their people the basic conditions of life, health, and education. In such states, can poverty be reduced without large-scale intervention, even a takeover of their government and administration? Singer is silent on these practical questions."

In addition, Gardiner (2004, p584) states that, "The per capita proposal does not take into account the fact that emissions may play very different roles in people's lives. In particular, some emissions are used to produce luxury items, whereas others are necessary for most people's survival." In extension, Shue (1993) calls for a greater partitioning of necessary and unnecessary (or luxury) emissions and asserts that the necessary emissions (e.g. subsistence agricultural emissions) be left uncontrolled and protected. In other words, it may be just to provide equal CO_2 emission rights and allow a trading scheme if everyone's basic needs were being met, but because deep developmental inequities exist, justice demands that an equitable CO_2 policy focus on the universal right to develop, rather than the universal right to consume.

From our perspective, current cap and trade mitigation approaches both in climate policy and philosophical proposals are well-intentioned, but myopic. In framing CO_2 emissions as a problem of income equity, they are insufficiently attuned to the practical challenges of development. The very nature of trade directs resources to the most profitable producing countries, not to the nations most in need from a human development perspective. Countries that sell emission rights, because they are relatively less-efficient at production, will have to purchase manufactured products from the industrialized nations that bought the emission rights in the first place. Furthermore, under an emission trading scheme, underdeveloped nations will not invest the proceeds of emissions permit sales in effective local development when they can gain greater risk-adjusted returns in more technologically sophisticated countries. As a result, revenues from permit sales will necessarily be directed towards increasing consumption of goods (and services) that are cost-effective to import. Therefore, we argue that morally speaking, CO_2 allocation policies ought to be centered on development-enhancing mechanisms since CO_2 emissions are a bi-product of necessary improvements in the human condition.

III. Climate Policy and Human Development

A proposal for climate policy that does consider development equity is offered by Baer (2009). Referred to as Greenhouse Development Rights (GDRs), Baer's framework determines an individual's obligation to climate mitigation constraints based upon a right to development principle. That is, Baer argues that there exists a level of welfare below which people should not be expected to share the costs of the climate transition because those individuals have little responsibility for the climate problem and little capacity to invest in solving it. Under the framework, the concept of a development threshold provides the basis for calculating national obligations for mitigating climate change. Baer considers two options for operationalizing the national obligations, including a large global fund through which all mitigation and adaptation would be financed or a global system of national allocations as the basis for a global trading scheme (i.e., cap and trade) (Baer et al., 2009). Despite his considerations of development inequities in determining responsibility for climate change, Baer undermines the ethic of development equity in his suggestions for implementing GDRs through financial transfers (i.e., income) that will not necessarily transfer into development.

Correlation of income and utility is not an uncommon assumption. Standard neo-classical economic approaches to representing human welfare rely on indicators of consumption, such as income, consumer expenditures, or GDP, as the sole determinant of human well-being. This interpretation is based on the assumption that individuals act rationally—i.e., that they want more rather than less of a good, and they choose options that are likely to yield the greatest satisfaction to themselves. However, empirical evidence from recent economic and behavioral studies suggests that the notion of

correlating well-being with consumption is an oversimplification. For example, Gowdy (2008) shows how the model of extreme rationality is of limited value as a predictor of human behavior in complex social situations. Therefore he asserts that the regularities of human behavior uncovered by behavioral science, rather than the assumption of rationality, be the starting point for effective economic policies. Also, Vermuri and Costanza (2005) discuss how life satisfaction data from the World Values Survey provide evidence that past a certain point, increasing per capita income does not increase human well-being. Additionally, Easterlin (2003) shows that social well-being tends to correlate well with health, level of education, and marital status, and not very well with income.

Two conclusions are of central importance from these critiques: 1) reducing per capita income growth in highly developed countries, as a result of a decrease in GHG emissions, may not necessarily mean a reduction in social welfare, and 2) increased income may not necessarily translate into improved human well-being for underdeveloped countries. The first conclusion is critical for fostering a reduction in the production of consumer goods, a required step in the process of reducing CO_2 emissions and ultimately stabilizing the climate system. In particular, it shows that reducing the costs for relatively wealthy polluters (by enabling scarce resources to be allocated in an economically efficient manner) will not necessarily correlate into loss of well-being among the populations in wealthy nations. The second implication is equally as important, as it may inform more efficient policy recommendations for human development. That is, where emissions trading results in income for underdeveloped countries, the result may be just as ineffective as international aid programs that transfer cash, but not *capabilities*.

IV. The Capability Approach

An alternative way of thinking about how to evaluate human well-being that encompasses more than measures of income is offered by the capability approach (Sen 1999a, 1999b; Nussbaum and Sen 1992; Nussbaum 2000, 2006). In contrast to the primacy of economic efficiency inherent in tradable permit schemes, the capability approach suggests that maximization of income, or resource consumption, is insufficient at addressing what people truly value. The central claim of the capability approach is that assessments of human well-being, or the level of development of a country, should primarily focus on the effective opportunities, or capabilities, that people have to lead the lives they value. The key concepts are a person's functionings and capabilities. Functionings are the valuable activities and states that make up people's wellbeing (e.g., a healthy body, security, education, and employment). A capability is an individual's set of opportunities or freedoms to realize functionings (Robeyns, 2006; HDCA, 2005).

The example of a bicycle helps to illustrate how functionings and capabilities relate. A person may own or be able to use a bicycle (a resource) and by riding the bicycle, the person gains mobility (a functioning). If the person is unable to ride the bicycle (because, perhaps, she has a broken leg), then having a bicycle would not create the same function of mobility. Nevertheless, the access to the bicycle coupled with the person's own characteristics, creates the capability for the person to move around town when she or he wishes. Furthermore, if the person enjoys having this capability (e.g., to visit friends), it contributes to their happiness (HDCA, 2005).

When developing measures, target capabilities can be selected by a community, team, or researcher depending on specific circumstances. For example, the UN's Human Development Index (HDI) was developed as a crude index that offers a better indicator of well-being and capabilities than GNP per capita alone, and can be established using widely available data. The HDI offers a method of evaluating human development not only by economic advances (standard of living) but also in terms of capabilities, as approximated by measures of life expectancy, literacy, and educational attainment. Measuring development with the HDI provides a more complete evaluation that can compare ideals of the capability approach at an international scale. For example, the United States has a 0.956 HDI value, while India has a much lower HDI value of 0.612 (Figure 1).

Empirically, carbon emissions have proven to be essential to achieving a state of high HDI. However, Figure 1 also highlights the diminishing returns to HDI that result from increases in emissions. Through this lens, reductions in emissions do not necessarily correlate with reductions in human well-being for prosperous countries, as traditional economic analysis would predict. Alternatively, it stresses that growth in poor countries is still essential, and rich countries that are already sufficiently productive will no longer be improved by quantitative growth (e.g., increases in consumption), but rather by more qualitative growth (e.g., improved health, education, and environment) that is less GHG intensive.

Now, let us extend the capability approach to assess the practicality of improving development through an emissions market using the example of water, an essential resource in a country's development and to an individual's well-being. Historically in developed countries, the establishment of a distribution system to disseminate potable water has proven critical for public health improvements (Nelson, 2001). However, for underdeveloped countries, access to treated water supplies is poor. The World Health Organization (WHO) and UNICEF (2000) estimate that, in the largest cities, those with a household or yard connection range from only 43% in Africa, to 77% in Asia, Latin America and the Caribbean. Moreover, the treatment and distribution of water is expensive, energy intensive, and by necessity a local process (Mintz et al., 2001). If the ability of a developed country to pay for CO_2 emissions exceeds that of the local populace in an underdeveloped country, then it is rational (in a neoclassical economic sense) for the underdeveloped country to sell their emissions rights to the developed nation.

However, there can be nothing gained from this transaction in terms of creating a sustainable water supply. From a neoclassical economic perspective, permit sale revenues would be best spent purchasing manufactured goods from technologically sophisticated countries capable of CO_2-efficient production. In other words, the income gained from permit sales will not increase the developing country's *capability* to provide potable water to its citizens. Drawing upon this example and others (e.g., health care services and education), we reason that emissions trading is an insufficient mechanism for enhancing the capabilities of people living in developing countries.

V. Our Policy Proposal

Article 1 of the United Nation's Declaration on the Right to Develop (United Nations, 1986) states, "The right to development is an inalienable human right by virtue of which every human person and all peoples are entitled to participate in, contribute to, and enjoy economic, social, cultural and political development, in which all human rights and fundamental freedoms can be fully realized." This declaration shows the UN's commitment to advance development throughout the world. Nevertheless, development requires access to cheap and reliable energy, which under current technological constraints will inevitably emit GHGs. This line of reasoning allows us to claim that the capability to emit CO_2 should also be considered an inalienable human right, because it is critical for developmental improvements.

In extending our claims to climate policy, we must object to the limitations placed upon developing countries by emissions trading. The examples of the bicycle and water availability in the context of the capability approach demonstrate that the accumulation of financial capital and consumer goods may be insufficient conditions for development. Yet, cap and trade approaches to climate mitigation allocate resources based on efficiency and profit, rather than development need. We propose replacing the principle of consumption equity advanced by a per-capita distribution of tradable permits, with a principle of *development equity*. We argue that developing nations have a fundamental right to emit, at least to the point of sufficient human development, and that the trading of those rights is immoral. From this view, a just mitigation strategy would prohibit trading between countries of different developmental stages, because less-efficient producers in underdeveloped countries should be protected from competition for resources on moral grounds that the act of production contributes to their development.

Furthermore, we argue that participating in local production processes can contribute to development in ways that consumption alone cannot. Solow (1991) explains that sustainability entails a choice between consumption now and investment in the future. Although people in underdeveloped countries may have unmet consumption needs, their needs cannot be met through money alone. That is, they must create the capability of channeling that money towards their unmet needs. For example, a country could not build a school solely on revenue gained through carbon sales. Buildings require concrete, steel and other building materials that are carbon-intensive. Schools also require electricity, roads, communications infrastructure, in addition to books, paper and chalk. Under emissions trading, all of these necessities will be supplied cost effectively by more technologically sophisticated countries that can produce these services for less cost (and less CO_2 emissions) than they could be produced in underdeveloped countries. Under an emissions market that maximizes consumption, it is illogical for underdeveloped countries to produce the necessary material, infrastructure, and services needed to establish necessities like schools, hospitals, and shelters. Furthermore, even if they did have some capabilities, they will not have the economic incentive to exercise these capabilities when it is cost-effective to import whatever intellectual services (e.g., engineering, legal services, management) that might otherwise result from the students trained in local schools or the people healed in local hospitals. By this reasoning, any investment that an underdeveloped country makes with the proceeds of their carbon revenues is counter-productive, when compared with consumption of goods produced by others.

In prohibiting emissions sales between countries of different development stages, we remove the incentives that restrict development. To comply with CO_2 caps, technologically sophisticated countries will have incentive to locate production in the underdeveloped countries that have the right to emit. As such, wages (and capital investment) will flow to workers in the needy country. A portion of the revenues that would have accrued in the underdeveloped countries will still accrue, but in the form of wages and investment, rather than in the form of carbon sales. In effect, our proposal allows the underdeveloped countries get both development (by participating in the production process) and income. This comes at the expense of the polluting countries, mostly through higher prices that result from lower production efficiencies. However, the developed countries can partially mitigate these higher costs by sharing technology with the underdeveloped countries that can make production more efficient.

A recent example that helps to verify our perspective on prohibiting emissions trading to support local development is India's nuclear power program. India has a flourishing and largely indigenous nuclear power program that aims to supply 25% of its electricity from nuclear power by 2050. This is despite the fact that the program has proceeded largely without fuel or technological assistance from other countries for 34 years (World Nuclear Association, 2011). India was temporarily excluded from the 1970 Nuclear Non-Proliferation Treaty, after refusing to comply with the treaty's safeguard system of reactor inspections that were used to prevent nuclear weapon development. Due to these trade bans and lack of indigenous uranium, India has been developing a unique nuclear fuel cycle to exploit its reserves of thorium. Although the ban on trade initially hampered India's nuclear power supply, it became an engine for local development in alternative nuclear technologies (World Nuclear Association,

2011). In 2008, the Nuclear Suppliers Group (NSG) removed the ban on India's participation in international nuclear trade, after they agreed to open up 14 of its 22 civilian nuclear facilities to international inspection (New York Times, 2008). Reciprocally, India recently passed a bill that allows foreign firms to build reactors in India to supply the county's vast atomic energy market. However, as a condition of sale, the foreign firms must share nuclear technology with India (BBC News, 2010). By requiring foreign companies to share technology, not just the products of that technology (e.g., electricity), India recognizes the value of acquiring the domestic capability for further nuclear development. It is also worth noting that the nuclear trade ban was only lifted after India reached a state of development that was sufficiently competitive to benefit from (rather than be damaged by) trade with more advanced countries. Even at this higher developed state, India's trade is still *conditional* on technology sharing. Through this example, we are not necessarily advocating the use of nuclear power as a pathway to development. Rather, we show how a ban on trade, although less economically efficient in the short-term, can foster local development of domestic production which can have a ripple effect in improving livelihoods for the long-term.

VI. Conclusion

The proposal we offer differs from the policy arrangements offered by Singer, Jamieson, Baer or Kyoto in that we are criticizing traditional emissions trading schemes that allow big emitters to buy more emission rights from countries emitting less. We argue that CO_2 policies which fail to display sensitivity to the limits of transfer payments risk inhibiting countries from being able to exercise their right to develop, rather than simply consume. By contrast, when human welfare is evaluated in terms of their capabilities, such as the HDI, the transfer of resources becomes less fungible. In other words, utilizing human development indices within climate mitigation trading schemes introduces parameters (such as life expectancy and literacy rates) that cannot be directly transferred like financial resources. Therefore, CO_2 emissions trading among countries of varying stages of development ought to be prohibited on moral grounds that the right to emit is at least a co-requisite for human development.

Our policy proposal offers a vision of global social justice by framing the problem of CO_2 emissions as a problem that can best be solved via a capability enhancing policy. This is a more just method of allocation than previously contemplated methodologies because if successful, this technique would result in an overall improvement in global human well-being. It incorporates the appeal of placing the responsibility of reducing emissions on developed countries, and therefore internalizes the external costs of greenhouse gas emissions, but also focuses on the importance of improved development in countries that are still developing. Specifically, it stresses that growth in poor countries is still essential, and rich countries that are already sufficiently developed will no longer be improved by quantitative growth, but rather by more qualitative growth. These ideals are reflected in the HDI, which includes GDP as a proxy for economic growth, but also assigns value to more qualitative assessments of human well-being in the form of education and life expectancy. It is the more qualitative growth among nations that will enable reductions in CO_2 emissions, as the focus of development shifts away from consumption. We assert that a ban on emissions trading will allow production processes to occur in developing countries that will likely enhance the capabilities of the people living there.

Our perspective on human development is consistent with the ideals outlined in the 1987 Brundtland Report, *Our Common Future* (1987), which states the following: "Meeting essential needs requires not only a new era of economic growth for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth."

The Brundtland Report also establishes the concept of development as sustainable development, and defines it as, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable development contains within it two key concepts: 1) "the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given", and 2) "the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs". In essence the report declares the need to redefine development in a way which blends the fulfillment of human needs with the protection of the natural world, from which planetary stability is inseparable. By framing climate mitigation strategies as an appropriate mechanism for enhancing human development, we thereby endorse the ideal of sustainable development as the necessary pathway to improving human well-being and reducing CO_2 emissions.

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